Flight

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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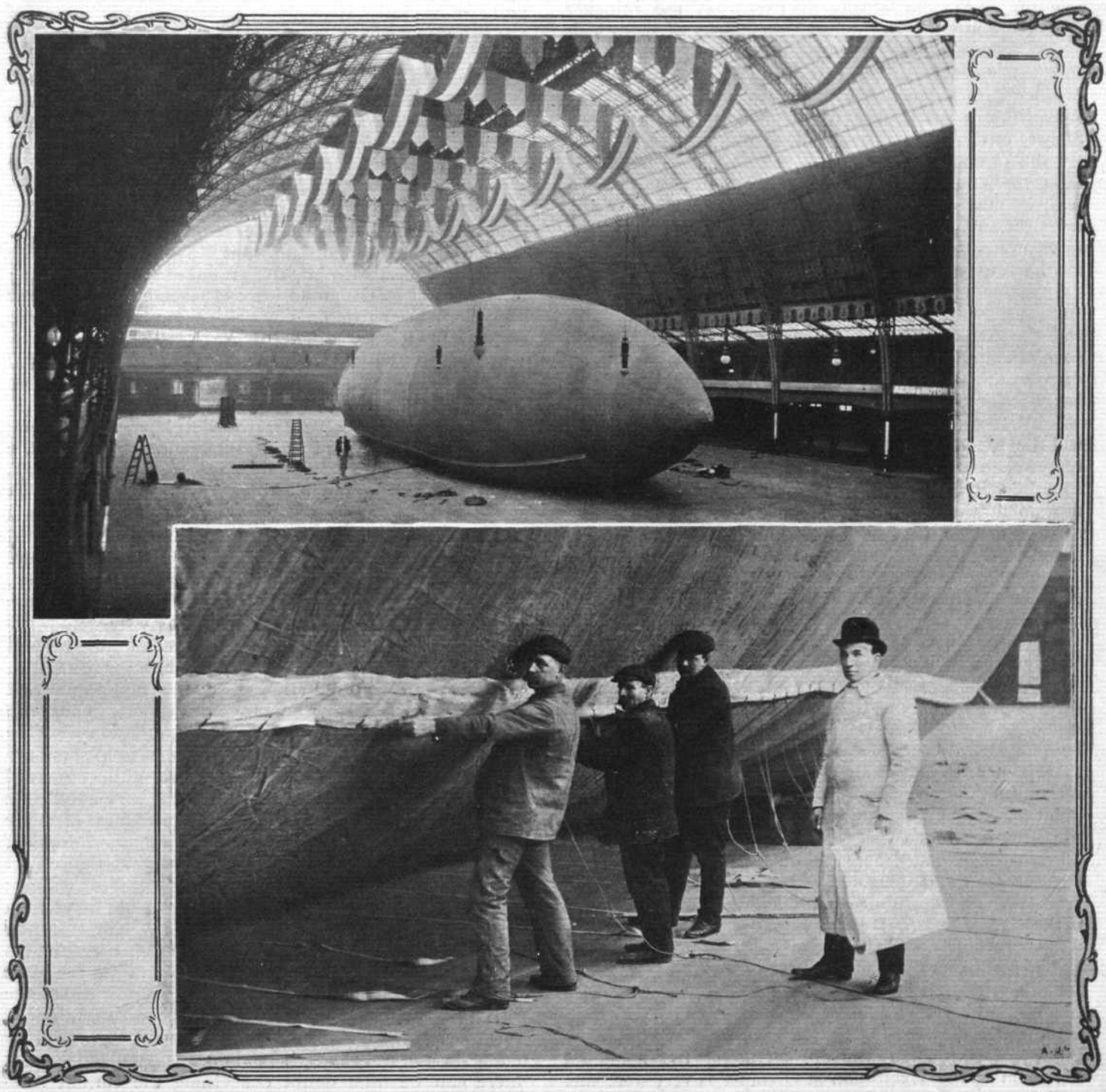


AERO EXHIBITION AT OLYMPIA.—First arrival at the Main Hall. The gas-bag of the Wellman airship on the main floor, after inflation, waiting for its car, engine, and other impedimenta, before being placed in position in the roof. In the lower photograph the suspension gear is being fixed to the balloon, Mr. Melvin Vaniman, the Chief Engineer to the Arctic Expedition, standing on the right with the plans in his hand.

"AN INDUSTRY IS BORN TO-DAY."

THE nineteenth of March, 1909, will be a memorable day in the annals of aerial locomotion in Britain. To-day an industry is born. There have been various aeronautical shows in this country since 1869, on May 25th of which year a great balloon, exhibited at Ashburnham Park, broke free, coming to earth at Bouldon in Buckinghamshire. In the main, former displays in this country have been chiefly remarkable for models displayed in illustration of various theories. The Show, which the Society of Motor Manufacturers and Traders has organised at Kensington, however, will be remembered not on account of its theoretical or its purely scientific side, but chiefly by reason of the bringing together of a number of full-scale machines of types with which mechanical flights have actually been made. For this reason it is fitting that a trade organisation as distinct from a sporting or scientific body, such as the Aero Club of the United Kingdom or the Aeronautical Society of Great Britain, should be primarily responsible for the promotion of the display. It speaks much for the astute councils that prevail at Maxwell House that a body of men engaged in one industry should have the foresight and the generosity to place their funds at the service of a sister one that cannot be expected to repay for the matter of years to come. The manner in which the motor trade has guaranteed the finances of the current show is something to be remembered to its credit, and the Aero Club of the United Kingdom is to be congratulated on having realised the splendid opportunity that has thus been presented. In the circumstances, it has been rather a privilege than a favour to accord official recognition to the display. Let us hope that it will be the first of a yearly series of an increasingly representative and prosperous character, so that it may come to stand in the helpful position towards the flying movement that the great annual motor car Show does towards mechanical road traction. Whatever its destiny, however, the current enterprise of the Society of Motor Manufacturers and Traders is a bright and honourable page in its history which will always redound to its credit.

Flight has been very much to the fore during the last fortnight. Mr. Haldane has stated in Parliament that the War Office intends to purchase flying machines from private persons, while the Navy estimates include provision for a dirigible. Whether these enterprises are to be on a suitably extensive scale or not, the fact remains that it is a capital thing to have secured Government recognition of the importance of the subject from the point of view of national defence. During the week, too, the King has paid a visit to Pont Long, by Pau, and, like all who have gone there before him, His Majesty has been amazed and delighted with the marvels that he has seen. A fact fraught with some significance for the future is the visit of Mr. A. J. Balfour to the same field a few weeks previously. The value of enlisting the interest of Cabinet Ministers and ex-Ministers in artificial flight is something not easy to over-estimate in connection with the part which this country should play in its development. For that reason, too, the presence of the many influential gentlemen who are attending the inaugural luncheon at the Exhibition at Olympia is very welcome. "Wake up, England" is a phrase which the Prince of Wales has made familiar throughout the Empire, and it is sincerely to be hoped that His Royal Highness will see fit to pay a visit to the Aero Exhibition at Olympia, for assuredly such a mark of royal interest will go far towards securing that widespread attention to the subject of aerial locomotion which is the chief object of the show, the purpose of it being mainly an educational one.

The current issue of FLIGHT strives to assist in the aim that is responsible for the holding of the Exhibition. In a sixteen-page illustrated supplement, which we present our readers, the story of aerial locomotion is told in a fashion that can be understood by those not possessed of the least liking for mechanics, while the souvenir should be appreciated by the expert as something to which an historic interest is likely to attach, even as it does to these early numbers of the journal itself.

While entertaining a healthy horror of aught in the guise of sensational prophesy concerning the future of the flying movement, nevertheless we have absolute faith in it, for could that belief be proven in any more practical fashion than in the launching of a periodical devoted solely to the subject of aerial locomotion? Even the most ardent sceptic must allow that mechanical flight has now entered into the realm of possible things. And there are reasons for arguing that the time is not far distant when flight will be regarded as among the commonplaces of latter-day life. Perhaps it is not generally realised that the science has been established on a very broad and significant basis. Apart from the hundreds of brilliant minds that are engaged in various parts of the world on the grand work of revealing new, simpler and surer means towards aerial locomotion, the public flights of Messrs. Wright, Farman, Bleriot, Esnault-Pelterie, Moore-Brabazon, and many others have appealed to the minds of practical business men to an extent that has resulted in practically any reasonable amount of money being available for the development of flying machines. Indeed, a large and influential section of the financial world is now fully alive to the tremendous future that is opening up for the flying industry. This establishing of the proposition on a strictly business basis is not a thing to be held in light esteem. The world moves mainly through the enterprise of practical men, without whose co-operation genius itself is paralyzed. The Exhibition at Olympia is proof of the fact that the business world is now prepared to support aerial locomotion and on that account it is memorable beyond all other aeronautical displays that have preceded it. Happily, too, the Exhibition is quite as representative a one as any reasonable man could expect, when the inevitable difficulties in the way of organisation and the patent interests which certain pioneers have to study are considered. It remains for the British public to avail itself of the excellent opportunity that is now afforded it of making acquaintance with flying machines of really practical sorts. The success that has attended works of fiction dealing with human flight proves that the subject is a fascinating one even to the non-technical public; hence it should not require much persuasion to cause a a very large number of people to flock to Olympia during the next week. Of course, it is a pity that actual flights have not been accomplished in this country to the same extent as has obtained in France, for naturally the public learns quickest through its eyes. It is certain, however, that during the coming summer plenty of flight will be made in these Islands, which means incidentally that there can be little doubt concerning the current Aero Show proving the first of a long and increasingly successful series.

THE FIRST BRITISH AERO SHOW.

By the time that this issue is before the eyes of our readers the doors at Olympia will have opened to admit them to the first British Aero Show, and we hope that no one who is within travelling distance of London will fail to pass through those doors, which will remain so invitingly wide until to-day week, the 27th instant. It is their duty, as well as to their interest, to do so; their duty because England needs encouragement in flight, and to their interests because they will there obtain a concrete idea of the flyers about which they have read so much of late. This show has been organised at considerable trouble and expense by the Society of Motor Manufacturers and Traders, who, with the support of the Aero Club, have done their utmost to ensure success. And, indeed, it is solely due to the high-minded action of this important body, that the new flight industry in this country is having such a good send-off.

It is not every day that an institution is to be found willing to risk a matter of £5,000—for that is about the sum the S.M.M.T. stand to lose in this matter—for the encouragement of a budding industry which, as yet, only concerns a small minority of its own members. And so the least that those interested in flight can do is to pay their shillings at the turnstile, as some small acknowledgment of their appreciation. It is the least the public at large can do also, and especially that section which is so very fond or crying out about the backwardness of this country in these affairs. Here is an excellent opportunity for them to show that they are at least interested in what they so freely criticise. They can go to Olympia, and there they can see what manner of flyers have already, more or less, taken root in this country. The Society of Motor Manufacturers and Traders have made no charge for floor space; and, since we cannot imagine that anyone could reasonably ask for further encouragement to exhibit his wares, the doubtful visitor may dismiss any idea of farce from his mind at once. This show is quite a serious affair, and it marks the beginning in this country of a movement of which no man can foresee the end.

To fly has been the ambition of human beings ever since they developed the brain-power necessary to appreciate the evolutions of birds. And flight has now been accomplished for the first time in history. It is useless to sit down and calmly say, as some people do, that this excitement about the Wrights and a few others is all very well, but that flyers are impracticable machines, and, so far as they can see, are likely to remain so. If Wilbur and Orville Wright had stopped their experiments when they first came to the conclusion that they would be unable to harbour their flyer in a bicycle shed, the world would still be ignorant of the wonderful things it is already possible to accomplish in the air; and doubtless those same pessimistic critics would still be calmly asserting that mechanical flight was impossible. Think of the innumerable developments which made the motor car possible! Who, in the first days of engineering, could have believed that engines, which were then as big as a house, would, in such a short space of time, come to be tucked away under the diminutive bonnet of an automobile? Pessimists may argue that they have no use for machines such as those at Olympia, but where should we be if the enthusiasts of the past had listened to the words of those who had no use for Stephenson's "Rocket"?

There is, in truth, much food for reflection to be derived from a visit to the Aero Show; and so many are the different facets which such an exhibition presents to the mind's eye that it fairly sparkles with points on which to conjecture. Look at the collection of small scale models got together by the Aero Club, some crude and some well finished. How unpromising, not to say impossible, most of them look as embryonic flying machines, when for a moment the mind forgets that flyers are already fledged which grew from such as these. Who knows, but in this very group there may be a secret which will guide progress? Turn again to the adult machines and hesitate no longer to believe that our country is in a fair way to take its place in the centre of the world's flight movement. What the Aero Salon brought to light in Paris, the present Show reveals in London—an aeronautic industry already started. And besides our British-built machines, we have the advantage of the French products to learn from and improve upon.

Reading through a mere list of the exhibits does not convey what it should. There were sixteen names in the preliminary list for the aeroplane section—names which we hope may become well known in the British world of flight, but concerning each of which it is only proper at the moment to point the special cause for interest. We may take them as they are printed on the preliminary list, viz., alphabetically, and at the head, therefore, is the Aero Club, who have, as already mentioned, organised the model section. Incidentally it may be remarked, however, that they have more than a small interest in the full-sized machines, for many of these, and others besides, which are not present, will make their trials, at an early date, on the Aero Club's new flight grounds at Shellbeach. Next on the list comes Esnault-Pelterie, who is one of the adherents of the monoplane principle, and who explained his reasons for being so in a paper which he read before the Areo Club only a few weeks ago. In France, at Billancourt, he has founded a factory, and in this country he has appointed Messrs. Bessler, Waechter and Co. as his agents. An all-British exhibit was to have been made by Jack Humphry, who has formed the British Aeroplane Syndicate to assist him in finding out the merits of a machine which he has designed and has had built at Wyvenhoe on novel lines, but the construction of the machine prevented its dismantlement for transport. Messrs. Lamplough and Sons give expression to still more radical views, for they advocate a certain system of flapping flight, as also, it may be mentioned, do the Miesse Petrol Car Syndicate, who represent the De La Hault machine, which is manufactured in France by Jules Miesse. Another well-known firm who likewise control the interests of a French-made car in this country—the Mass car—are representing an equally notable flyer, the Delagrange.

M. Monnet has scratched, he cannot be ready in time, and he has patent matters to attend to, but Moore-Brabazon's flyer, which was built by Voisin in France, was one of the first machines to put in an appearance. It is, of course, the most interesting of all the flyers at the Show, for it is the actual machine with which the famous flights were accomplished, and, as such, it is probably the only machine which can claim the distinction of the term "flyer" as having been earned by its achievements. Mr. Moore-Brabazon was the second

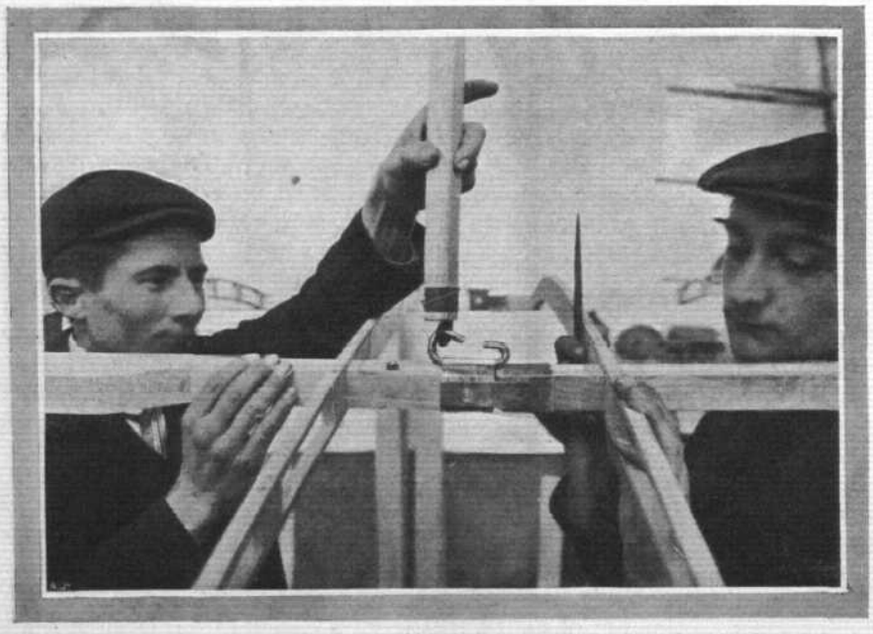
Englishman to fly, Mr. Henry Farman having been the first, and we hope Mr. Moore-Brabazon will be the first to put up some real flights in this country.

Handley Page, who is a British constructor, has been building a full-sized machine to the designs of Mr. Weiss, whose interesting bird model was described in *The Automotor Journal* of April 13th, 1907, and another machine on totally different lines for Mr. Deverall Saul. It is, of course, a thousand pities that Messrs. Short Brothers are unable to exhibit a Wright flyer, but they have built a machine of their own design which has some original features and gives an idea of their constructive ability. Among French-built machines, none have been so thoroughly successful as those which come out of the Voisin factory, the concession for which Messrs. Simms and Co. may consider themselves fortunate to have obtained. The Gobron-Brillie agency in this country have arrangements with M. Breguet, who has experimented with many types, including the helicopter, and whose constructional work is characterised by the use of steel where others use wood. Messrs. Whittaker were down to exhibit a Pischoff machine from France, which has not materialised, but Captain Windham is showing a flyer, constructed by Pischoff, which he has had built for his private experiments. Messrs. Howard T. Wright take rank among our first British constructors, on whose collective prosperity the progress of flight in this country depends, and the Howard-Wright biplane, which to a certain extent follows conventional lines, embodies, wherever possible in its construction, steel tubing of a special section. It is not like the Wrights' flyer in design, but we hope its patronymic may prove a happy augury for its success.

Included among the names on the preliminary list of aeroplane exhibitors is that of the Wolseley Company, whom it is pleasant to find associating themselves with the new movement. But they are not, as a matter of fact, actually represented by a flyer, nor unfortunately is the Aeroplane Construction Co., for whom they have built the special engine which they have on view. That section of the show which is devoted to aero-motors is, in fact, of extraordinary interest, both for the variety of its exhibits and for their collective significance. "Necessity is the mother of invention," says an old adage, and the aero-motor section is a practical example of its truth, for when aviators said that they must have lighter motors than the already light engines that are used in cars, designers set to work to invent something to suit, and, from a common basis, each evolved a different design. Of late there has been a reversion of feeling to a certain extent, and so it comes about that the aero-motors of to-day include specimens of altogether unusual types, as well as others which are orthodox to a degree. It is a very good example of how quickly the advent of a progressive influence remoulds accepted notions to its own requirements. Indeed, there is much to learn among the aero-motors, and it does not need to be an engineer to appreciate a great deal that they can teach, although in this, as in all things, the more complete the knowledge, the wider the horizon comprehended in the mental view. It is gratifying to find that British constructors are taking up the problem in competition with Continental engineers, and that at least one firm—the New Motor Engine Co.—have shown their ability to achieve a radical departure in design.

There is yet another section of the Aero Show which is necessary to its comprehensiveness. It includes some balloons and a dirigible. They represent the first and second stages in the conquest of the air, for the dirigible came before the flying machine and the balloon came first of all. How fascinating ballooning may be, it is only necessary to consider its wide popularity to appreciate. And it is a useful pastime as well—how useful depends on circumstances, as for instance, the siege of Paris. Dirigibles, unlike balloons, can struggle against the wind; but, with them also, circumstance determines the scale for measuring their importance. Other nations possess them and so must we, even though now and again the elements destroy a ship or two. Whether an airship will be the means of discovering the North Pole is a matter of perennial speculation, which once again is on the tapis since the dirigible at Olympia is that with which Mr. Wellman intends to make another attempt to get there. The balloons are for pleasure, and and one of them affords an opportunity for the inspection of the famous Continental fabric about which everyone has heard so much. That this fabric has played no inconsiderable part in the development of flight is shown by the fact that it is used on the Farman aeroplanes, as well as in the construction of the gas vessels of the Clement-Bayard, Gross, Zeppelin, "La Republique," and other successful dirigibles. The winning balloon in the last Gordon-Bennett Race was also made of this fabric.

Last, but we hope not least, the new sport and industry has this weekly journal, Flight, wherein we hope to give all the encouragement that a popular journal can to the new movement. In our next issue we shall give a detailed account and illustrations of the many interesting things which are at the Show, but in the meantime we have pleasure in presenting to our readers a pictorial supplement illustrating the history of flight to the present day, and this will, we think, have an interest quite unique for those who care to keep it as a souvenir for future generations.



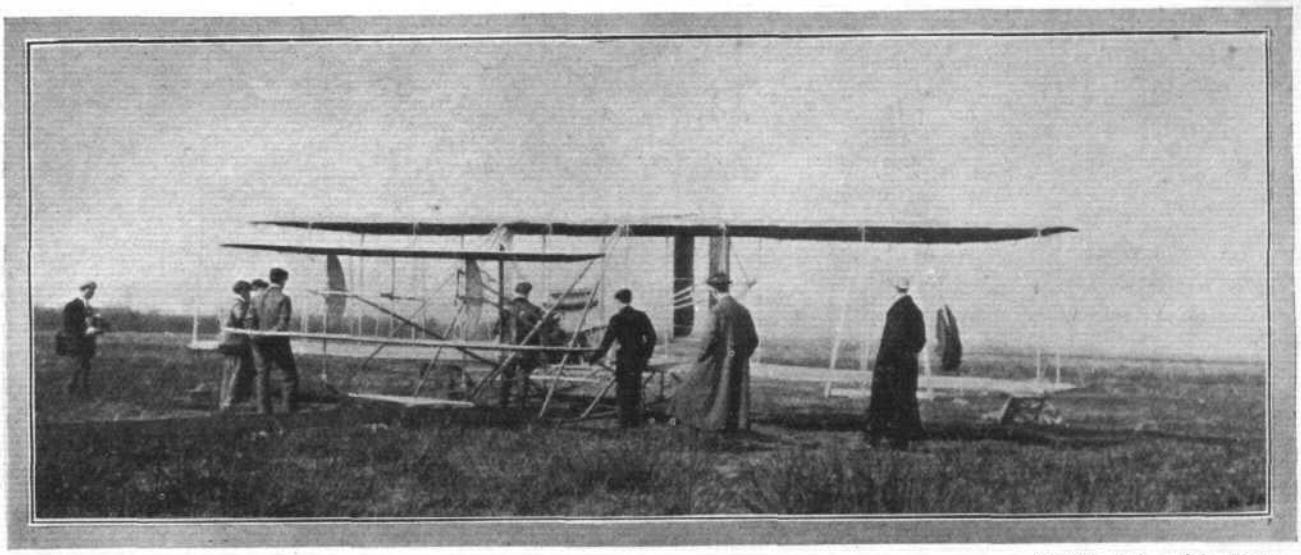
THE WRIGHT FLYER.—Special method of joining up the main framework and stays of the flyer, enabling it to be easily dismantled for transport.

HOW WILBUR WRIGHT RIDES THE WIND.

By H. MASSAC BUIST.

WE had turned the car off the road into the enclosure at Pont Long and were in the act of alighting to thread our way out of the long string of other vehicles, the owners of which had preceded us on to the practice ground, when a whirring noise overhead and the casting of a shadow for an instant caused us to gaze upwards. At that moment the 40-foot broad biplane, the appearance of which has been rendered familiar throughout the world by photographic and other reproductions innumerable, swept over our heads not more than 20 feet above the tops of the cars. There were two men on the machine, and it was the pupil, the Comte de Lambert, who was controlling the machine. It was his eighteenth lesson, and at that time he had been practising for a total of not more than four hours. Yet the master seated beside him was allowing him not to cross the line of vehicles, but to fly deliberately over and along it, so that it would have been absolutely impossible to have alighted quickly without disaster.

That was my first glimpse of the Wright aeroplane in actual flight. By the time we had walked a couple of hundred yards or so to the huge brown shed the lesson had been voluntarily concluded by bringing the machine to earth hard by the starting rail, in readiness to be mounted and launched on another flight with another pupil aboard.



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TRYING THE ENGINE.—Here you see Wilbur Wright, with his left-hand feeling the water-circulating pipe, and his right busy with an oil-can, Orville standing beside him suggesting and discussing in characteristic fashion. You may know the machine is not yet ready for flight because the starting weight has not been hauled up.

What happens when Wilbur Wright wants to fly? Perhaps the best course will be to endeavour to give a more or less consecutive account of the processes gone through. When the big doors of the reddish-brown shed have been rolled back, the four-year-old aeroplane is revealed, with all the woodwork rendered resplendent with aluminium paint, with which the propellers are also treated. This is not for ornament, but is a precautionary measure, because long use in all sorts of weathers having rendered the woodwork dirty, it has been found that the coating of aluminium paint serves the dual purpose of a preservative and a means of throwing any cracks or fractures into relief. The back of the machine faces the opening of the shed, and as soon as the biplane, which is mounted on two wheels, is drawn into the open, one notices that the canvas is worn and torn, soiled and burnt, patched and stained, and tattooed with tintacks. There are stretches as big as a towel that have been sown and tacked on because the original fabric has been destroyed by one means or another. On the other hand, there are bits in the canvas that have evidently been burnt through by placing a lighted cigar or cigarette on them. Such trifles, however, do not worry the Wrights, for they do not fly by a hair's breadth, as it were, but in virtue of having devised a system that works.

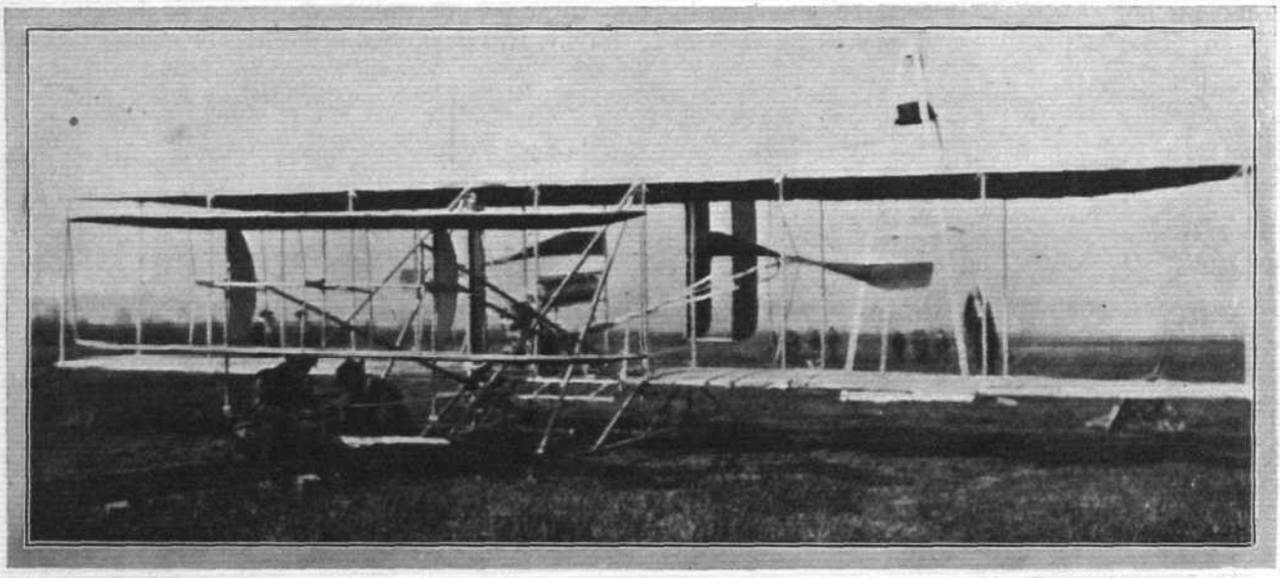
As you follow the little party of half-a-dozen or so who push the weather-stained machine to the starting-rail, one or two things strike you as being rather peculiar. In the first place, you notice that it is being bumped about a good bit. So you glance over the Champ d'Aviation. Regarded as an expanse of over four miles in circumference, it certainly answers to the description of flat land; but when any part of it is considered in detail, it is impossible to discover a single square yard of level. It is composed of a series of close-set hummocks or mounds, some almost hemispherical and anything from a foot to 20 ins. in diameter and from 6 ins. to 16 ins. high. Certainly no aeroplane fitted with wheels could be run over or let down on such country. Accordingly, it is not surprising to learn that the Pau authorities have leased another and smoother ground nearer the city for the use of those experimenters whose flying machines are fitted with wheels. Yet the Wright aeroplane has not a single spring, pneumatic cushion or other shock-absorber of any sort, whereas all the wheel machines employ means of deadening the shock of landing even on smooth ground.

When the American aeroplane is placed on the starting-rail, an examination of it proves that the reports that have been put abroad to the effect that it is crudely built are not borne out in fact. The design is extremely simple and bold, and there is not the slightest hint of "finnikiness" anywhere; but the work is all quite well finished. Indeed, the only feature that can have given

rise to so utterly misleading a report is the evidences of age and use that the machine bears. Truth to tell, it is a wonderfully handy piece of mechanism, for quite apart from the use that has been made of it, there is no brittle thing that can be hurt by handling, as the French machines evidently are, to judge by the black looks you receive if you lay a finger on them. No one minds in the least if you lend a hand in manœuvring the Wright machine on to the starting-rail; nor does anybody instruct you to catch hold of it here and not to touch it there.

The much discussed starting apparatus, that has been dispensed with on more than one occasion, though never publicly, is a light version of the ancient Roman instrument for hurling missiles. Should need arise, a couple of men can move it from one part of the ground to another. The 75-foot rail is the only part that needs to be changed. It is laid in one or other of three directions, according to the wind, the work of changing it over occupying about twelve minutes, so that it is a common thing to hear Wilbur Wright instruct his mechanic to have the rail changed to another direction field, being left under the planes during the preliminary proceedings that the aeroplane may remain stable. If it chances to be your first visit to Pau, you may doubt if Mr. Wright will ever go up, so long do the preparations usually take him. The brothers and their assistants never seem to be working against time. But if you had been to Pont Long you would be well aware that there is only one signal which Mr. Wright gives, and which invariably means that a flight is about to commence. Until the starting-weights begin to be raised off the ground you never know whether he will order the machine back to the shed without making a flight. But the moment his willing helpers begin pulling at the rope, you may rest assured that within the next ten minutes the machine will be rushing along the starting-rail.

Oil-can in hand, with pockets bulging with "waste" and twine, a screw-driver, a wrench, and other less indispensable tools, Wilbur Wright, clad in a suit the trousers of which have plainly long been strangers to the press, and having a motor cyclist's type of leather coat over his jacket, usually begins proceedings by giving a



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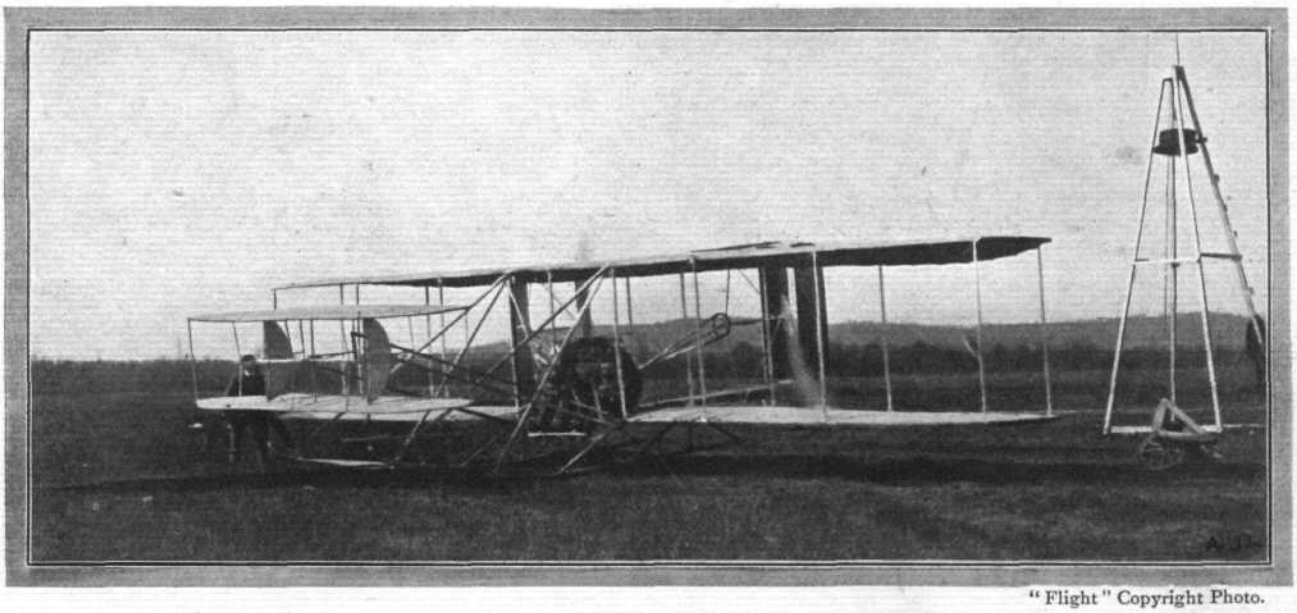
THE MOST TICKLISH PART OF THE BUSINESS.—Here is portrayed the final art of preparation, for the starting weight has just been hoisted, and Wilbur is about to climb out from under the machine, having fixed the rope catch. Once, in America, the catch went off unawares, and Orville had a narrow escape, his wracked shoulder being troublesome for months.

immediately he has launched the aeroplane in flight, so that everything may be in readiness by the time he has given one pupil a lesson. The rail itself is a very flat piece of iron, laid on a piece of wood, that is admirably illustrated in the photograph published on page 128 (March 6th). The woodwork raises the rail to approximately nine inches off the ground. Only two ball-bearing wheels, made solid and of about three inches in diameter, are employed. They are set one in front of the other, bicycle fashion, and spaced about a foot apart; very slight flanges are furnished to keep the wheels on the rail. The starting bogie consists of a beam just long enough to reach from one runner of the aeroplane to the other, and affixed midway, in swivel fashion, to the support on which the wheels are mounted, so that when on the rail the aeroplane can be turned round with the utmost ease.

The placing of the machine on the starting bogie occupies scarcely more than a minute, one of the single-wheel trolleys on which the machine is drawn about the rapid glance over the whole machine. Then he will climb over the slack tangentially-set wires and stand in front of the machine, brother Orville joining him. "Right," he will say to the mechanics, one of whom stands behind each screw. "One, two, three," is the signal, at which they put pressure on the handiest blade, thereby turning the engine over, two or three attempts being usually needed to start the motor. The men have to be alert to get their hands clear of the propellers the instant they begin to turn, at which moment some onlookers have usually to be warned to move out of the line of the revolving blades, which are so broad at the extremities that being six feet in diameter, and turning at not more than 450 revs. a min., can be just detected if one fixes the gaze on a given spot above the upper plane. To obviate the likelihood of the blades ever striking the ground, they have been raised slightly above their former position, so that they extend above the upper plane and do not reach down to the lower one. When first tried in the new position, it was found there was an inclination to

thrust the machine downwards, but by altering the range of curvature of the front flexing planes for controlling the flight path, and by making sundry other minor adjustments, matters were found to work satisfactorily. The relatively enormous size of these propellers by comparison with the French ones, as well in the matter of diameter as of surface, is extraordinary, quite apart from the great pitch that they have and from the fact that two propellers revolving in opposite directions are employed in place of one as generally exploited by the French school, many of the foremost members of which, however, are now inclining to use two propellers, even as in biplanes they are having to space them two metres apart, which the Wrights all along maintained was the closest possible distance without losing efficiency through the compression of the air by the bearing of the upper plane being communicated to the upper surface of the lower plane. The relatively little disturbance of air caused by the revolving Wright propellers cannot but impress anybody who has watched other machines. The Americans seem to play, and you do not see anybody making wires taut, as in the case of the rigid French-built machines.

Having run the motor for a while, during which he has been busy with an oil-can, Wilbur Wright may ask for some hot water. "Don't suppose there's any," says the mechanic, strolling off. "What about that they were making tea with?" shouts Wilbur after him. "Go and ask the chef fellow." Meantime he gets busy with a spanner, hangs his watch up on one of the struts that heads from the runners to the upper main plane, and calls out, "Smoke, somebody, please." Immediately half-a-dozen responsive puffs enable him to see the exact extent to which the wind has veered round during his testing. The hot water being now forthcoming, and thick grease having been stuffed into the guide tubes through which the propeller chains pass, Wilbur strides down the starting-rail in his tremendously energetic manner to the point where the rope tackle runs round the pulley wheel. Now you may come forward and lend a hand at the hauling, even as Mr. A. J. Balfour has delighted to



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JUST OFF!—This snapshot was taken three seconds after Wilbur had pulled the release catch. It shows you his "flying face" and characteristic crouch, with cap pulled well over the eyes, the gaze being fixed in the far distance. You see, too, how the front portion of the machine is slightly raised by the pull being nearly at the normal flying angle. As he reaches the end of the rail Wilbur will pull back the lever in his left hand with all his might to set the front planes at the maximum angle to the wind.

disturb only that amount of air which is necessary for the actual propulsion of their machine, there being seemingly no churning to waste.

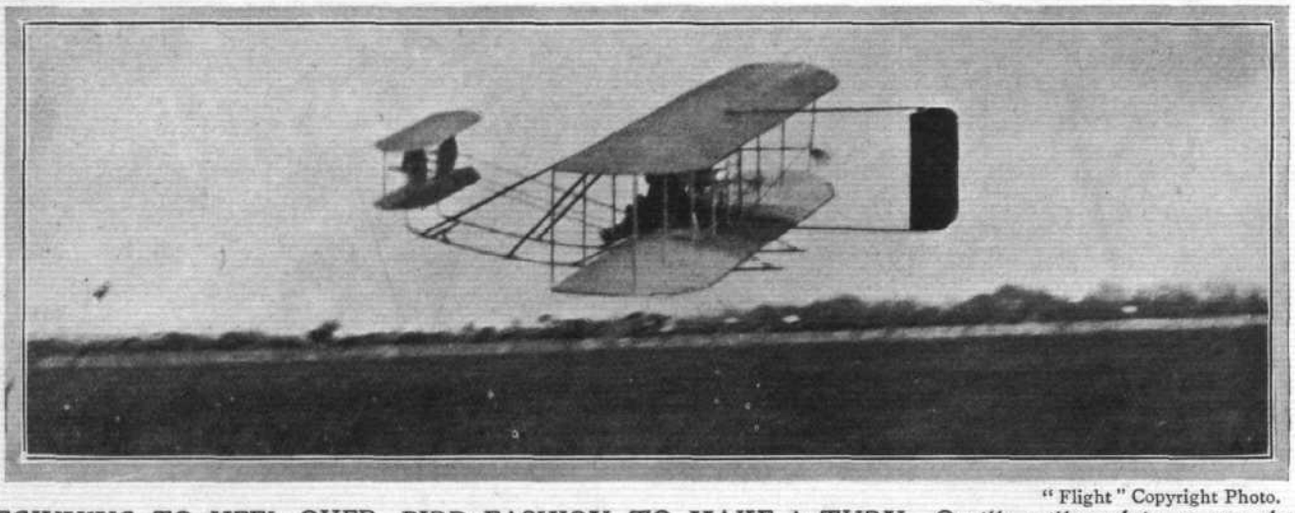
Anybody accustomed to seeing a petrol motor run in a chassis, or on a bench, receives a shock on beholding the engine start in the Wright aeroplane. "Shiver my timbers!" you exclaim, instinctively, as it appears to bounce and wriggle about on the pliant frame. When it is running slowly at the start, it seems inevitable that its breaking adrift can be a matter of minutes only. Yet if you try to follow the vibrations to any extremity of the machine you will fail to do so. The shocks caused by the power pulses are quite absorbed before they reach the extremities of the main planes, or the flight path control planes forward, or the vertical rudders behind. Then it begins to dawn on you that this non-rigid type of biplane, with its extraordinarily simple and ingenious design for resisting shocks at those points where they are likely to be received, has really no need of coil springs, pneumatic shock-dampers, combinations of levers and other guess contrivances. The scheme allows plenty of do. As the weight begins to rise, you will hear a murmur from the roadway where the thousands who have not ten francs to spare for the privilege of entering the enclosed ground wait patiently, knowing that once the craft has been launched in the air, they will see its performances as well as any of the privileged ones.

Wilbur walks slowly back along the rail with the releasing catch mechanism in his hand. Presently he climbs under the aeroplane and sets everything himself, nobody else ever being entrusted with this important business. It is not void of risk, though the only awkward incident that has ever occurred in this connection was when something missed, and Orville found himself and the machine rushing down the rail at forty miles an hour with the motor working and nobody aboard. That was in the early days in America. During the scurry, he managed to climb to the motor and stop it, but suffered a wrench to his shoulder that left it weak and stiff for a matter of eighteen months thereafter.

"Who tied this up" asks Wilbur, pointing to something as he climbs out from under the machine. A

mechanic having signified that he is responsible, also that he had no proper string. "Never you do that again," says Wilbur, adding, "Always go about with a ball of twine in your pocket." Producing one from his own, he calls over his shoulder, "Mr. Tissandier—you're elected," whereupon the famous little amateur balloonist quickly buttons up his coat, and seats himself in the place immediately beside the motor. Straightening his back as a relief from the bending posture, Wilbur jerks a glance towards the horizon as though actually viewing the wind, then, buttoning up his short leather overcoat, he casts a final rapid glance over the machine, from which Orville has never taken his eyes all this while, for both brothers are extremely careful that everything shall be absolutely right before the launching.

An instant later Wilbur has taken his seat, with "Little Tissandier" between himself and the motor. He tugs the familiar old cap tight and low over his eyes, signals the mechanic to draw a supporting plank away from under the plane, grasps the long lever for controlling the elevation of the front planes with the left hand, feels for the release-catch with his right hand between his legs,



"Flight" Copyright Photo.

BEGINNING TO HEEL OVER, BIRD FASHION, TO MAKE A TURN.—Orville will explain to you that the turning is done more by warping the planes in opposite directions in synchronism than with the rudder. The machine is shown about to begin a turn, which is often effected with the aeroplane heeling over at an angle of 45 degrees. The road and the spectators are shown in the background. This photograph was taken by Mr. Griffith Brewer, the well-known balloonist.

nods to the mechanic to let go his hold of the wing by which he has been easily keeping the machine balanced, gives the release-catch a sudden jerk, and, with a whirr, the gigantic half-ton glider has started down the rail at 40 miles an hour. Before it has traversed the entire 75 feet it has passed the spot where the pulley-catch drops free. The instant it reaches the end of the rail Wilbur changes his crouching attitude by throwing back his body to get the maximum power for pulling back the lever with his left hand to the utmost extent, so that the machine rises slightly as it leaves the rail, the bogie tumbling free on to the ground below at that instant.

But the machine rarely rises into free flight immediately on clearing the rail; instead, it usually scrapes along the ground for 40 ft. or 50 ft., or even more, bumping from hummock to hummock, until you would declare it could not possibly rise, if only on account of the presumable braking effect. But the idea has scarcely come in mind to you than you perceive the machine to take a distinct upward set, whereupon it rises obviously clear of the ground, and there is no longer any doubt that the craft is actually flying. Having given the engine a little relief by allowing the machine to fly level for a few moments thereafter—for the motor only develops 24-h.p. at starting and lifts a half-ton machine and two men, which is assuredly a degree of proficiency out and away beyond the capacity of any other type of aeroplane at present known—it is again made to rise to any height between 16 ft. and 30 ft., for, with pupils aboard, it is usually kept within the bounds of the ground, and there is nothing like an aeroplane in flight for eating up distance, because it can travel straight. So, in a little you will espy the machine developing a cant, and as it leans over just like a bird, it will turn with equal ease and in relatively as small a compass by the warping of the outermost quarters of the two main planes to an extent that cannot be detected by the eye unless the wings chance to be so flexed, in opposite directions in synchronism, when the machine is brought to a standstill. In one of the illustrations in this issue, Mr. Griffith Brewer, who represents the Wright interests in this country, has shown the machine in the act of making a turn, one of the pupils being responsible for actuating the *gauchissement*, as the French term the wing flexing. That accounts for the comparatively slight tilt, for the pupils do not turn abruptly right away, as the Wrights can do by making the machine heel over to an angle of 45°. This is something so startling to state that perhaps one is not completely convinced of the fact until one's own eyes have beheld it. The proceeding, however, is no out of the ordinary one, as a visit to Pont Long would quickly convince you. I have never seen a photograph taken close to the aeroplane, and depicting it tilting over to the full extent, yet I should fancy that, were one procurable, it would be the most picturesque aspect of an aeroplane flight possible to snapshot. But there are many difficulties in the way of getting such a snapshot, for you never know whereabouts Wilbur Wright will make one of his amazingly sudden turns; also, he does not allow photographers to go wandering about the field during flights.

The exigencies of space are imperative, therefore many aspects of the amazing machine in flight cannot be discussed on the present occasion, when I will conclude by indicating how the pupils are taught. In the first place, the Wright machine is unique in that no learner need risk his life by finding out how to fly "all on his own."

Instead, you get aboard in an ample seat beside a man who knows how to handle the machine, and learn your business as safely as though you were being taught how to drive a motor car.

Has it ever struck you that MM. de Lambert, Tissandier, and Gérardville are learning how to drive the Wright aeroplane left-handed? That is because only one of the levers is duplicated, namely, that for actuating the front minor planes, which Wilbur Wright holds in his left hand, and the pair of which the pupil grasps with his right hand. Between them is the single lever for controlling the wing flexing and the rudders. It has a movement in all four directions and takes the place of two independent levers which Orville Wright prefers to employ. At first the pupil is only allowed to try to control the flight path by the use of the lever, which he grasps with his right hand. At the sixth lesson—they average about twenty minutes each—a quick learner like "Little Tissandier" will begin to try the *gauchissement*. This is to say, he places his left hand on top of Wilbur's right, and first feels, then tries to make the movements. In this position the elbows of master and pupil are in touch, so that the instant the teacher nudges to learner the latter desists, giving over all control to his instructor. That way safety lies. The rush of wind past the ears renders speaking impossible.

And you may say that there is nothing more in learning to aeroplane than that and handling it as a glider without power applied. The pupils all tell you the machine is amazingly simple to handle. You may judge that from the fact that when he came to fly at Le Mans, Wilbur Wright had not had as much experience with a power-driven aeroplane as the Comte de Lambert had at his eighteenth lesson, by which time he had handled it for a total of about four hours *only*. In those circumstances is it any marvel that Wilbur's flight path was somewhat undulating when he began at Le Mans, feeling very nervous, very ill, and with the whole of his reputation at stake? Would you not expect to "wobble" when riding a bicycle for the first time in eighteen months, particularly if you were the first man who had ever balanced on one, so that you had to find out everything for yourself?

But Wilbur Wright's first three pupils will not learn the machine left-handed, for they will sit in Wilbur's seat. And presently MM. de Lambert, Tissandier, and Gérardville will teach each the other how to handle the aeroplane from Wilbur's seat, so that in time they will be ambidextrous at the business.

Of the niceties of manœuvring in mid-air, the consummate ease with which the machine can become lost to view when scouting, the gracefulness of its circlings and tiltings, its rises and its dips, the matter-of-courseness with which it is put to fly a measured kilom. just as you would drive a motor car past a mark; its excursions over woods and crowds of carriages and onlookers, the accuracy of its alighting at the very doors of the aerodock or beside the starting rail, and the astounding smoothness of its landings, are matters that must be discussed anon.

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NEWS OF THE WEEK.

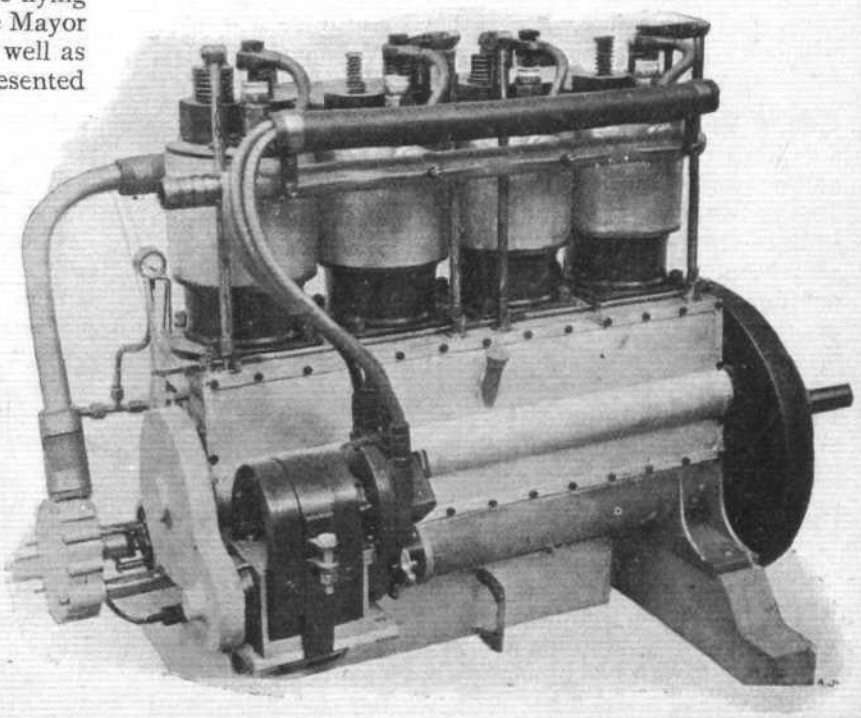
King Edward sees the Wrights Fly.

OWING to the inclement weather, from which Pau seems to be suffering as much as most other places, King Edward had to postpone his visit to the Wright flying ground from Monday last to Wednesday.

On Wednesday the conditions were favourable and the King motored over to Pau shortly after one. Having lunched at Pau, His Majesty motored over to the flying ground at Pont Long, where he was received by the Mayor of Pau. The Wright Brothers and their sister, as well as Count Lambert and M. Tissandier, having been presented to the King, His Majesty was conducted to the aeroplane shed, where he carefully examined the mechanism of the apparatus, which was explained by Wilbur. Having been decorated with the British, French and American flags in honour of the occasion, the aeroplane was brought out and Wilbur first made a "solo" ascent, during which he showed, in a most striking manner, the capabilities of the machine and the wonderful control he has over it. After a short interval, sister Katherine climbed into the passenger's seat and Wilbur started off once more. He first of all ascended to a great height and then came down again, skimming quite close to the earth, and after this little exhibition, started off for "a ramble" in the direction of Pau and was out of sight for about six minutes. On coming to earth, Wilbur and his sister were warmly applauded by the King and the little group of spectators surrounding him, and His Majesty heartily congratulated the Wrights upon the success of their flyer.

Wright Invited to Spain.

AMONG Wilbur Wright's latest invitations are two from Spain, one of which comes from the municipality of Valence, who want him to attend their fête in May, when the King of Spain is expected to be present, and the other is from the authorities of San Sebastian.



The 32-h.p. 4-cyl. Engine of the Wright Flyers, weight 87 kilogs.

Moore-Brabazon Flyer Back in England.

MOORE-BRABAZON, immediately he had finished his experiments at the Chalons Camp, had his aeroplane dismantled and packed up for transit to England, for the Aero Show at Olympia, where the Voisin machine will probably be one of the most interesting exhibits for visitors during the coming week.

Santos Dumont Goes to Saint Cyr.

SANTOS DUMONT has taken his miniature monoplane back to his trial ground at Saint Cyr, and anticipates making some sensational flights with it after a few more preliminary experiments. Already, as our readers know, he has done remarkably well with his little machine.

Bleriot at Buc.

ON Monday, M. Bleriot made several flights at Buc, the longest of 2½ kilometres, including turning, which was covered in two minutes, while a series of short flights, between 500 and 700 metres in length, were made against a wind blowing at 40 kilometres an hour.

Captain Burgeat Buys an Antoinette.

CAPTAIN BURGEAT, of the French Curassiers, has purchased "Antoinette VI" for his own use.

Farman Aeroplane Leaves for Vienna.

THE Farman flyer, which has been purchased by an Austrian company, has now been dispatched to Vienna.

The French Pupil Pilots at Work.

DURING the last two or three weeks the trial machine used by the pupil pilots has been in hospital, and truth to tell, we should not be surprised to see one or two of the pupils themselves there before long. Only the other day, when the machine, once more itself, made its first flight of about 60 or 80 metres, M. Desvaliers took a header off the driver's seat as the result of a faulty manœuvre. He picked himself up safe and sound, however, and is now once more waiting for repairs to be effected, for it was he who put the flyer *hors de combat* on the last occasion.

Barker Aeroplane.

AT Dijon, MM. Barker have constructed a flyer which is going to Spain. It is of the Voisin type and is fitted with a 50-h.p. Anzani engine.

Goupy Flyer.

THE Goupy flyer, with which trials are being made at Buc, was, as our readers are aware, constructed at the Bleriot factory. Its span is only 6 metres, and its surface only 26 sq. metres. Unlike "Bleriot No. 11," which is also peculiar for its short span, this machine has, as we mentioned last week, two main supporting planes, and although the upper one is placed a little in advance of the lower one, the machine is what is properly understood as a biplane. It is fitted with a 25-h.p. R.E.P. engine, and is mounted on three wheels. The weight without the aviator is 209 kilogs., and with the pilot on board and in running order, does not exceed 290 kilogs.

Further Progress with the "Silver Dart."

IT will be remembered that during the early days of Wright's experiments in France each succeeding flight was about double the distance of the preceding one, and Mr. McCurdy is adopting somewhat similar tactics in his experiments with his biplane "Silver Dart" at Baddeck, Nova Scotia. His first flight of any distance was of 4½ miles, which was succeeded by one of 8 miles, and on Thursday of last week he completely eclipsed this performance with a flight of 19 miles. It looks, therefore, as though this machine was going to be a formidable rival of the Wright flyer.

Graham-Bell Tetrahedral Machine.

ON Monday last, Dr. Graham-Bell's tetrahedral aeroplane "Cygnet II" was again tried over the ice at Baddeck, N.S., and although a speed of 15 miles per hour was attained, the machine failed to rise. Dr. Graham-Bell will now overhaul the apparatus and embody one or two improvements which have been worked out as a result of the experiments. It will be remembered that we published some particulars of this machine in our issue of February 27th.

Monaco Meeting.

THE entry list closed for the Monaco Meeting on Monday of this week, March 15th, an extension of date having been granted from March 1st, at which time 17 names were on the list, and the number has since grown to 35. In our last week's issue we announced six further entries, and twelve other names have since been received, including M. Zipfel, Societe d'étude d'aviation, M. Levi, M. Hornstein, M. Fernandez, who have entered biplanes, M. Raoul Vendome, who will use a monoplane, M. Fabre, who has a hydro-monoplane, and M. Bertrand, M. Petit, M. Gabriel Sezuin, M. Sergeant, and an Italian, who have not yet specified their machines.

Rheims Circuit.

THE Municipal Council of Rheims has voted 40,000 francs towards the Rheims Circuit, and there is a prospect that several valuable prizes may in addition be offered by individuals.

Short Brothers Build Wright Flyers.

MANY people have doubtless wondered what the Wright Brothers were going to do with regard to England and the introduction of their flyers into this country, and very few indeed could have known that the well-known aero engineers, Messrs. Short Brothers, have for some little time now been engaged on their construction. It was not that there was really any need for secrecy in the matter, but merely because Messrs. Short Brothers themselves have been so very anxious to avoid any suggestion of "puffing" themselves by the aid of the Wright name that the information has hitherto been regarded as strictly private, and it is only because Mr. Griffith Brewer, who is acting as patent agent for the Wrights in this country, considered it proper to make the matter public, that it has become known at the present stage. It is not difficult to guess that applicants for the right to build the famous flyers in this country have been sufficiently numerous and importunate in their petitions, and it is by no means difficult for those who know the Short Brothers to understand why those other brothers in France should have given them the first chance. They have a factory, and they are used to working with that care and precision on which depends the safety of all who risk their life in the air; moreover, since the eldest brother has come down from the north—where he has lately been associated with the Hon. C. A. Parsons in certain experimental work—the firm represents a combination of theory and practice such as is dear to Wright's heart. He has entrusted them with the building of six machines, which represent a money value of £8,400, and for the moment this is all that has been decided on, for the Wrights are essentially cautious people, who know how

much depends on their forethought in matters relating to flight; similarily with the Short Brothers, who, because they wished to show that they could satisfy these scrupulous Americans before they talked about it, sought to keep their work behind the scenes. Presently, when the first flyer is finished, there will be trials on the Aero Club's private ground at Shellbeach, where, perhaps, Wright himself may one day show us "how it's done."

Messrs. Charles Jarrott and Letts and the Wright Flyer.

ALL who know the useful and energetic work which Mr. W. M. Letts has, with Mr. Charles Jarrott, put into the automobile movement during the number of years that they have been associated with it, will learn with interest and pleasure that they have already closely associated themselves with the new flight industry by acquiring a concession from the Société Astra in France, whereby they have the sole right of disposing in Great Britain and the Colonies of Wright flyers which are built in France. The first delivery will consist of four machines, and no others can be received before October. The first pair of these will probably arrive in May, and on one of them an option has been acquired by an Australian; the other will be offered to the Government. The third machine is expected to arrive in June and will be used for private experiments, and the fourth machine, expected in July, is still open for sale at a price of about £1,400, which will include a guarantee that the machine will fly for 20 minutes. How amusing it will seem years hence to look back and read of a twenty minutes' guarantee of a flying machine! Yet in the old days we knew of cars which could hardly have justified a better contract when taken out for trial on one of their bad days.

Cowes a Port of Call.

IT appears that the Havre Aero Club have been in further communication with the Cowes District Council with a view to establishing facilities for the landing and repair of flying machines in the Isle of Wight; to this the Council have now replied that they will be pleased to render such assistance as they can.

Cross-Channel Landing Ground at Rye.

BETWEEN Dungeness and Hastings there is a coast line giving an open stretch of sand in the vicinity of Rye, which, it has been suggested, would form a very suitable place for aeroplanes to land when reaching this country from abroad. We trust that aviators in general, and invading armies in particular, will observe the courtesy of alighting on the spot thus selected for their reception. It is said that an aeroplane station is to be constructed at Camber, near Rye.

Brescia Circuit.

AN aerodrome has been acquired by the Mayor of Brescia whereon sheds will be erected for the benefit of those aviators who take part in the Brescia circuit.

Ligue Nationale Dinner.

FIVE hundred members and friends attended the first official dinner held by the Ligue Nationale Aerienne, under the Chairmanship of M. Paul Doumer, at the Hotel Continental last week.

L.N.—Rennes Section.

ANOTHER new section of the Ligue Nationale Aerienne has been founded, this last having its head-quarters at Rennes, under the presidency of M. Laurent.

Society of Encouragement.

AMONG the new members elected to the General Committee of the French Society of Encouragement of flying are Prince Leon Radziwill, Henry Desgrange, Michel Clemenceau, and Jacques Vernes. The Marquis de Roquefeuil has been elected a life member.

Aeroplane Factories in America.

IT is reported that a factory capable of turning out a hundred aeroplanes yearly is being established at Hammondsport, N.Y., where the first experiments with the "Silver Dart" were made. It is said that the head of the concern is Mr. C. F. Bishop, President of the Aero Club of America.

The Napier Automobile Co. of America are also contemplating the construction of airships and aeroplanes at their factory at Boston, Mass. It is estimated that the dirigibles will cost from £1,600 to £7,000, according to size.

Aviation in Texas.

IF Texas does not become a centre of aviation during the summer it will hardly be the fault of Mr. E. H. R. Green, president of the Texas Midland Railway. He has ordered a Wright machine, which, it is said, will cost between $7,000 and $8,000, and he is organising a club among several of his friends, at least ten of whom will order aeroplanes for delivery during the summer. It is also proposed to have an aeroplane "tournament" in the autumn.

Aviation in Parliament.

ON Monday, in reply to Mr. Carlile, Mr. Haldane said that Mr. Cody's engagement with the War Office terminated on the 30th inst., but it was being extended to September 30th next. With regard to civilian engineers co-operating in the construction of balloons at Aldershot, permission for this could not be granted. As to a substantial sum being included in this year's Estimates for experiments in aeroplane construction, Mr. Haldane had nothing to add to what he had said in introducing the Estimates. The Army Council propose during the ensuing year to consider the machines of private inventors, and to direct the attention of special officers to the study of the subject. What experiments may be made or machines bought as the result it would be premature to forecast.

Answering a question by Lord Winterton, Mr. Asquith said a communication had been received from the Canadian Government regarding the possibilities of the "Silver Dart," and it was at present receiving the attention of the War Office.

On Tuesday, in the House of Lords, Lord Montagu moved for a return showing the amount expended by the Great Powers upon aerial navigation for military purposes. He pointed out that in view of the rapid progress which was being made he hoped to use an aeroplane before long, in his visits to the House. In reply, the Earl of Crewe referred to the Army experiments, and said that last year France expended £470,000 upon balloon battalions, and Germany £133,751. For the present year £19,000 had been allocated, and if increased funds were found to be necessary they would be forthcoming.

British Navy Airship.

FURTHER experimental work is contemplated by the Government in connection with aeronautics, this time for the British Navy, but whether the new machine will

be an aeroplane or an airship does not appear certain, as references which have been made to any new constructional work only refer to an "aerial vessel," and the cost is to be paid by a part of a grant of £59,000. It will in all probability be a dirigible, and it is stated that the framework of a machine is being built under the supervision of two naval officers at Portsmouth. Official experiments will be carried out with this when it is completed.

"Zeppelin" Rises 5,643 Feet and Lands on *Terra Firma.*

IMPORTANT trials were made with the German military dirigible "Zeppelin" last week, in the course of which an ascent to an altitude of 5,643 feet was accomplished entirely with the use of the elevators.

On Tuesday last the "Zeppelin" made a successful landing on the ground. Hitherto the Zeppelin craft have always descended upon the water, and this had been held to be a disadvantage of this type of airship. The craft, with Count Zeppelin at the helm, came down to within about eight feet of the earth, when it was held down by soldiers. Some of the steering planes were damaged by striking a tree, and they had to be removed.

Bayard Airship Bought by Russia.

RUSSIA has bought the "Clement-Bayard" dirigible, and two Russian army officers are already in charge for the purpose of carrying out trials before the machine is transported to St. Petersburg.

Vaulx Airship at Work.

COUNT DE LA VAULX has recommenced his demonstrations with the first of his small airships, which was taken out towards the end of last week and created considerable impression on those who saw it boldly fighting the wind as it sailed over Paris. Count de la Vaulx is very enthusiastic on the subject of these small dirigibles, and seems convinced that they are the right thing from almost every point of view. They are comparatively inexpensive to construct, and can be built very quickly, so that a fleet having a large carrying capacity could be put in service in a shorter space of time than would be required for the execution of one very large airship. Moreover, there is not the same serious disablement in the event of an accident.

Belgian Dirigible.

BELGIUM is likely to very shortly awake as a centre of airship activity, for the Aero Club of Belgium and the Society of Engineers have ordered a dirigible from M. Surcouf, which will be known as "La Flandre," and there are two others in course of construction by Messrs. Solvay and Goldschmidt. The first of these, "La Belgique," will have a gas vessel of 2,700 cubic metres capacity, and will be fitted with a Vivinus motor.

Gordon-Bennett Balloon Race.

THE plains of Schlieren, near which are the gasworks, will be used as a starting point for the next Gordon-Bennett balloon race, which takes place from Zurich. Six hundred men will be necessary to act as assistants in the inflation and marshalling of the balloons prior to the start, and the military authorities have promised their assistance. Happy in its prospect of attracting a crowd, Zurich is making preparations to gain the greatest benefit possible from the event, and all Switzerland is, it is said, to be laid under a general subscription for the expenses. At a recent general meeting of the committee there was a motion on the agenda to discuss the creation of a prize fund of 1,200,000 francs.

It is probable that the French colony resident in Switzerland will present a prize to the first French aeronaut who secures a place in the race.

When the entries closed on Monday night they numbered twenty. The countries which have entered a full team of three balloons are Switzerland, Germany, Italy, France and Belgium. Spain will be represented by two, and the United States, Great Britain and Austria by one each.

The representatives of Great Britain will be Mr. Frank McClean and Mr. Griffith Brewer.

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MILITARY AUTHORITIES ON AERONAUTICS.

FOLLOWING Colonel Stone's admirable paper read last week, and which was reported fully in last week's issue, some very pregnant opinions on the military value of aeronautics were contributed by some well-known military experts.

Col. Capper, who opened the discussion, pointed out how skilled pilots would take advantage of air currents to travel long distances without using the engines, and thus economise fuel, and for that reason it would be as easy to attack inland as on the coast. Small dirigibles of the non-rigid sort, that could be packed up and filled with hydrogen on board ship, would be serviceable; also, he suggested the employment of small balloons that could be towed along, then cut adrift and exploded when they had floated over the desired area. Launching bombs was a matter of taking advantage of speed and height. It was necessary that we should be furnished with the aerial means of preventing an enemy launching and massing its air vesssls. We had yet to learn whether or not the explosion of a bomb dropped from a balloon would not cause a sufficient disturbance of air to burst it. At present the question of attacking balloons by aeroplanes was impracticable, for heavier than air machines could not rise as quickly as the gas-filled craft.

Col. Massey thought that the employment of many small vessels would be preferable to that of large ones, and pointed out that the French experiments in dropping dummy shells on targets had given satisfactory results.

Col. Warburton urged that a number of free balloons should be sent down the wind and made to discharge their bombs automatically. An enemy, he claimed, could not land and ships were the only things which could get out of the way of such an attack.

Major Baden-Powell thought changing atmospheric conditions would make long voyages difficult to make, while Major Sir Alexander Bannerman pointed out that in the case of an air-vessel dropping a bomb from a height of 5,000 feet the bomb would probably have to pass through half-a-dozen different air currents. He thought that dockyards or harbours might be hit with some degree of accuracy, but that battleships would be immune.

Col. Stone, replying to the points raised, agreed with the last speaker, and maintained that an aerial enemy would only attack vital areas owing to the expense and to the difficulty of aiming from great heights. He thought that bombs might be successfully discharged while air-vessels were travelling as distinct from hovering. As to the size of dirigibles, it would be determined by the speed question.

AERO CLUB OF THE UNITED KINGDOM.

OFFICIAL NOTICES TO MEMBERS.

Aero Exhibition at Olympia.

The Aero Exhibition at Olympia, held under the auspices of the Aero Club of the United Kingdom, opened yesterday and terminates on the 27th inst. Members of the Aero Club are admitted free on production of their Aero Club membership cards. The Princess Rooms are placed at the disposal of the members during the Exhibition.

During the Exhibition, the offices of the Aero Club will be at the Princess Rooms, Olympia (Telephone, 3632 Kensington).

Wright Aeroplanes.

In connection with various offers to provide Wright aeroplanes for flying in England, the Aero Club have received a communication from Messrs. Wright Bros., asking the Club to point out to intending purchasers the importance of seeing that the ownership of the Wright aeroplane carries with it full rights of user in England. The Aero Club will be pleased to answer any enquiries.

Gordon-Bennett Balloon Race.

The Aero Club have entered one balloon to compete in the Gordon-Bennett Balloon Race which takes place at Zurich in September or October next. The Club will be represented by Mr. Frank McClean and Mr. Griffith Brewer.

New Members.

The following new members have been elected :—

William Frederick Adams.	T. H. M. Greenly.
W. R. Cooper.	Julian A. Halford.
Major Palmer Dalton.	R. P. Hearne.
Comdr. O. H. Davies, R.N.	Charles A. P. Howes.
Capt. H. H. P. Deasy.	John P. Koch.
Rev. Edward Foord-Kelcey.	E. J. Mazzuchi.

In order that a complete record may be kept of flying machines in this country, the Committee of the Aero Club will be glad to hear as soon as possible from those members who are building or purchasing machines. Full dimensions should be given.

Membership.

The membership of the Aero Club is rapidly increasing, over one hundred new members having been elected during the last two months.

HAROLD E. PERRIN, Secretary.

The Aero Club of the United Kingdom,
166, Piccadilly, W.

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CORRESPONDENCE.

*** *The name and address of the writer (not necessarily for publication)* MUST *in all cases accompany letters intended for insertion, or containing queries.*

PROPELLERS AND MOTORS.

To the Editor of FLIGHT.

SIR,—*Re* Mr. Hollands' letter in FLIGHT, March 13th.

I did not attack Mr. Hollands on the Hollands propeller, and if your readers go back to the original correspondence from me they will find no mention of any particular propeller or person but a letter advising experimenters to make greater efforts to place themselves in an independent position, and be able to understand and make propellers for themselves. If the correspondence be sifted carefully I think it will be found that Mr. Hollands attacked me with a letter full of irony and "levity" which I was unwilling to pass by.

I am pleased to know that the "Hollands" has such great efficiency in a static state, but I do not agree that it is the same on a moving body—on a moving body the thrust only approximates in efficiency to the thrust on a static body—in very large propellers, the difference getting larger as the size of the propeller decreases.

Yours very truly,
MONTFORD KAY.

FLYING MACHINE CRITICISM.

To the Editor of FLIGHT.

SIR,—In your issue of February 13th there appears a letter from Mr. E. Wilson, in which he indulges in some very scathing remarks on the aeroplane, or, to give it a better name, the aerofoil. Whatever may be the present defects and shortcomings of these machines, they at least have the credit of placing aeronautics as a practical science on a substantial basis, and it is to be hoped that their continued success will do something to eliminate the "crank" from aeronautics.

To those who have studied the problem with insight, there is no question that these machines are built on sound scientific principles, and it will be an interesting study to watch their future development in Great Britain, and their management by those who understand them and those who do not.

These early attacks on a practical and successful machine, and the bolstering up of a theoretical monstrosity, ought not to go unanswered.

One could take Mr. Wilson more seriously if he would condescend to give details of the machine he advocates, such as horse power, weight, &c.

It is quite time flying machine inventors got down to solid facts. The problem is governed by hard and fast laws, just the same as any other science. The time for dreaming is past.

There are generally several ways of approaching a problem, but Mr. Wilson should withhold such trenchant criticism until he has done at least as much as Messrs. Wright.

Yours faithfully,
Streatham. E. C. DWYER.

A MODEL ENGINE DESIGN.

To the Editor of FLIGHT.

SIR,—In reply to Mr. Potter's letter in FLIGHT, March 13th.

Sixteen years ago the petrol motor was practically non-existent, and, consequent on the development of the petrol motor, the steam engine has been improved to keep in a competitive position in the mercantile world. Sixteen years ago every engine was slow moving, now every engine is fast moving, because vibration has been reduced to a minimum, and extreme improvements have been made in metals. High rates of piston speed have entirely displaced low piston speed.

With low piston speed the engine requires to be larger and heavier than is the case with a light engine having high piston speed to produce the same power. The same holds good with regard to weight, low piston speed, and increased steam pressure to produce the same power as a light engine with high piston speed and low pressure.

It is no uncommon thing now to find an installation driven by steam engines with a speed of 700 to 850 revs. per min., and which cannot be heard running a few yards away, a thing impossible to find until recent years. The enclosed balanced type of engine has made this possible.

I do not think badly of Mr. Potter's engine, but I do think that it cannot be quite so good as the engines in general use, owing to mechanical limitations consequent in the design, and when dealing with aeroplanes the greatest efficiency is desirable in h.p. weight of engine.

Yours very truly,
MONTFORD KAY.

WRIGHT AEROPLANES.

To the Editor of FLIGHT.

SIR,—In connection with various offers to provide Wright aeroplanes for flying in England, my Committee are requested by Messrs. Wright Bros. to point out to intending purchasers the importance of seeing that the ownership of the aeroplane carries with it full rights of user in England.

Yours faithfully,
AERO CLUB OF THE UNITED KINGDOM,
HAROLD E. PERRIN, Secretary.

PRESENT STATUS OF MILITARY AERONAUTICS.

By GEORGE O. SQUIER, Ph.D., Major, Signal Corps, U.S. Army.

(*Continued from page* 150.)

The "Zeppelin" (Figs. 5 and 7).

The Zeppelin airship, of which there have been four, differs from all others in that the envelope is rigid. Sixteen separate gas-bags are contained in an aluminium alloy framework having sixteen sides, covered with a cotton and rubber fabric. The pressure of the air is taken up by this framework instead of by the gas-bags. The gas-bags are not entirely filled, thus leaving room for expansion.

The rigid frame is 446 ft. long, 42½ ft. in diameter, and has ogival-shaped ends. It is braced about every 45 ft. by a number of rods crossing near the centre, giving a cross-section resembling a bicycle wheel. Vertical braces are placed at intervals the entire length of the frame. The sixteen gas-bags are completely separated from each other by partitions of sheet aluminium. Under the framework is a triangular truss running nearly the entire length,

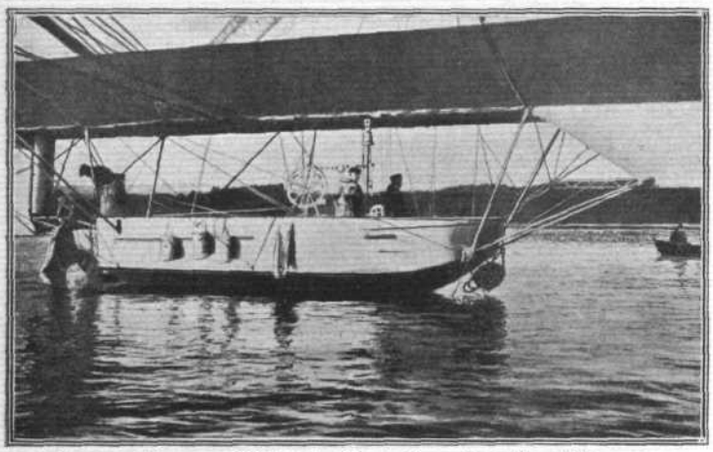


Fig 7.—German Dirigible Zeppelin. Details of the car.

the sides of the triangle being about 8 ft. The total volume of the gas-bags is 460,000 cub. ft., which gives a gross lift of about 32,000 lbs.

Suspension.—The two cars are rigidly attached directly to the frame of the envelope, and a very short distance below it.

Cars.—The two cars are built like boats. They are about 20 ft. long, 6 ft. wide, 3⅛ ft. high; are placed about 100 ft. from each end, and are made of the same aluminium alloy. To land the airship it is lowered until the cars float on the water, when it can be towed like a ship. A third car is built into the keel directly under the centre of the framework, and is for passengers only.

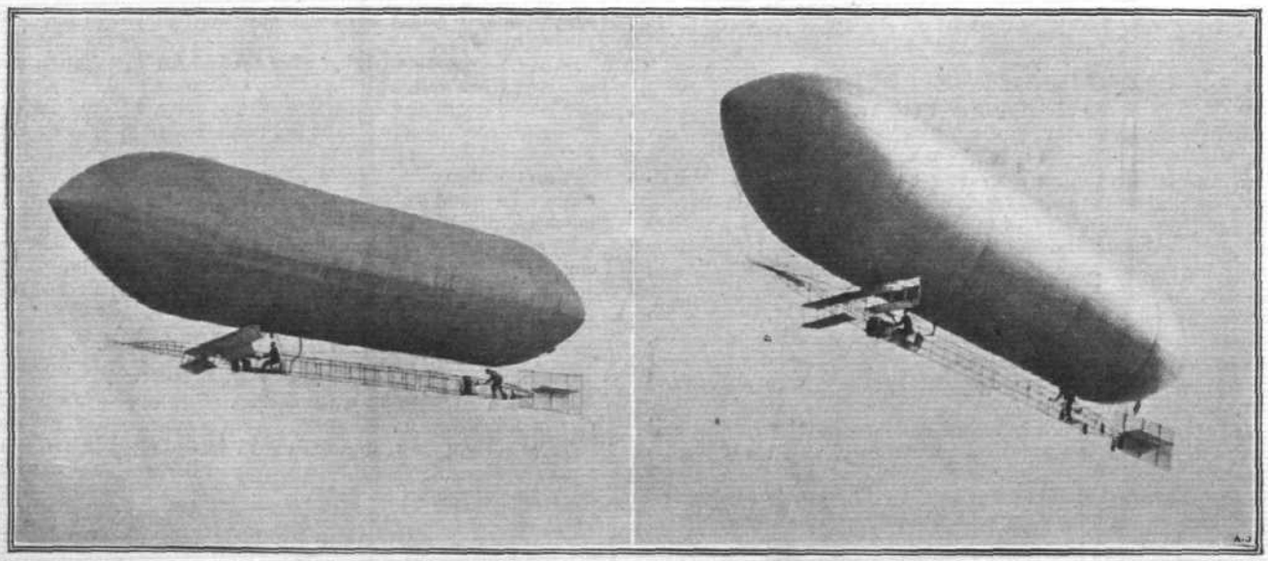
Motors.—The power is furnished by two 110-h.p. Daimler-Mercedes motors, one placed on each car. Each weighs about 550 lbs.; sufficient fuel for a 60-hours' run can be carried.

Propellers.—A pair of three-bladed metal propellers about 15 ft. in diameter is placed opposite each car, firmly attached to the frame of the envelope at the height of the centre of resistance where they are most efficient.

Stability.—In addition to the long V-shaped keel under the rigid frame, on each side at the rear of the frame are two nearly horizontal planes, while above and below the rear end are vertical fins.

Steering.—A large vertical rudder is attached at the extreme end of the rigid frame, and an additional one is placed between each set of horizontal planes on the sides. For vertical steering, there are four sets of movable horizontal planes placed near the ends of the rigid frame about the height of the propellers. Each set consists of four horizontal planes placed one above the other and connected with rods, so that they work on the principle of a shutter. These horizontal rudders serve another very important purpose, due to the reaction of the air. When these planes are set at an angle of 15 degs., and the airship is making a speed of 35 miles per hour, an upward pressure of over 1,700 lbs. is exerted, and, consequently, all the gas in one compartment could escape, and yet, by the manipulation of these planes, the airship could return safely to its starting-point. Its best performances were two long trips made during the past summer. The first, July 4th, lasted exactly twelve hours, during which time it covered a distance of 235 miles, crossing the mountains to Lucerne and Zurich, and returning to the balloon-house at Friedrichshafen on Lake Constance. The average speed on this trip was 32 m.p.h. On August 4th, this airship attempted a 24-hour flight, which was one of the requirements made for its acceptance by the Government. It left Friedrichshafen in the morning with the intention of following the Rhine as far as Mainz, and then returning to its starting-point straight across the country. A stop of 4 hours 30 mins. was made in the afternoon of the first day on the Rhine, to repair the engine. On the return, a second stop was found necessary near Stuttgart, due to difficulties with the motors and the loss of gas. While anchored to the ground, a storm came up and broke loose the anchorages, and, as the balloon rose in the air, it exploded and took fire, due to causes which have never been actually determined and published, and fell to the ground, resulting in its complete destruction. On this journey, which lasted in all 31 hours 15 mins., the airship was in the air 20 hours 45 mins., and covered a total distance of 378 miles.

The patriotism of the German nation was aroused. Subscriptions were immediately opened, and in a short space of time $1,000,000 had been raised. A Zeppelin Society was formed to direct the expenditure of this fund. $85,000 has been expended for land near Friedrichshafen; shops are being constructed, and it has been announced that within one year, the construction of eight airships of the Zeppelin type will be completed. Recently the Crown Prince of Germany made a trip in the "Zeppelin No. 3," which had been called back into service, and within a very few days the Emperor of Germany visited Friedrichshafen for the purpose of seeing the airship in flight. He decorated Count Zeppelin with the Order of the Black Eagle. German patriotism and enthusiasm has gone further, and the "German Association for an Aerial Fleet" has been organised in sections throughout the country. It announces its intention of building fifty garages (*hangars*) for housing airships.



Figs. 8 and 9.—U.S.A. Signal Corps' "Dirigible No. 1" in flight, Fort Myer, Va., August, 1908.

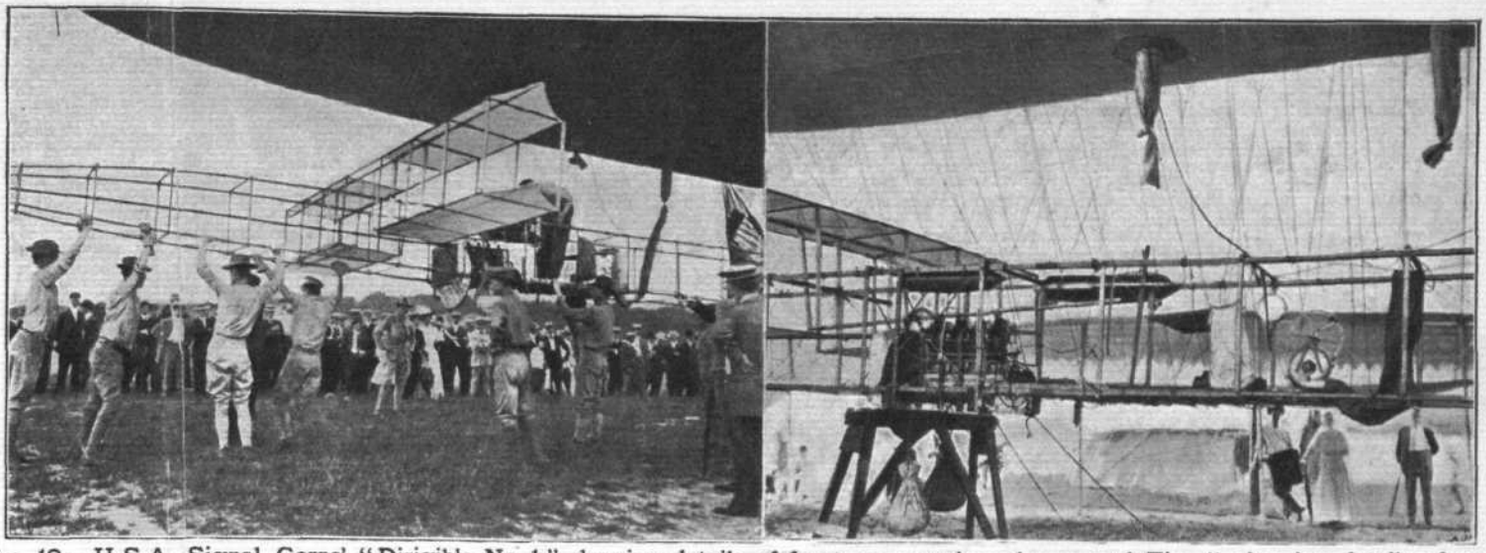


Fig. 10.—U.S.A. Signal Corps' "Dirigible No. 1," showing details of front manœuvring planes, and Fig. 11, showing details of car.

UNITED STATES.

Signal Corps' "Dirigible No. 1." (Figs. 8, 9, 10, 11 and 12.)

Due to lack of funds, the United States Government has not been able to undertake the construction of an airship sufficiently large and powerful to compete with those of European nations. However, specifications were sent out last January for an airship not over 120 ft. long, and capable of making 20 m.p.h. Contract was awarded to Captain Thomas S. Baldwin, who delivered an airship last August to the Signal Corps, the description of which follows :—

Gas-Bag.—The gas-bag is spindle-shaped, 96 ft. long, maximum diameter 19 ft. 6 ins., with a volume of 20,000 cub. ft. A ballonette for air is provided inside the gas-bag, and has a volume of 2,800 cub. ft. The material for the gas-bag is made of two layers of Japanese silk, with a layer of vulcanised rubber between.

Car.—The car is made of spruce, and is 66 ft. long, 2½ ft. wide, and 2½ ft. high.

Motor.—The motor is a 20-h.p. water-cooled Curtiss make.

Propeller.—The propeller is at the front end of the car, and is connected to the engine by a steel shaft. It is built up of spruce, has a diameter of 10 ft. 8 ins. with a pitch of 11 ft., and turns at the rate of 450 r.p.m. A fixed vertical surface is provided at the rear end of the car to minimise veering, and a horizontal surface attached to the vertical rudder at the rear ends to minimise pitching. A double horizontal surface controlled by a lever and attached to the car in front of the engine, serves to control the vertical motion and also to minimise pitching.

The position of the car very near to the gas-bag, is one of the features of the Government dirigible. This reduces the length and consequently the resistance of the suspension, and places the propeller thrust near the centre of resistance.

The total lifting power of this airship is 1,350 lbs., of which 500 lbs. are available for passengers, ballast, fuel, &c. At its official trials a speed of 19·61 m.p.h. was attained over a measured course, and an endurance run lasted two hours, during which 70 per cent. of the maximum speed was maintained.

"Dirigible No. 1," as this airship has been named, has already served a very important purpose in initiating officers of the Signal Corps in the construction and operation of a dirigible balloon. With the experience now acquired, the United States Government is in a position to proceed with the construction and operation of an airship worthy of comparison with any now in existence, but any efforts in this direction must await the action of Congress in providing the necessary funds.

Balloon Plant at Fort Omaha, Nebraska. (Fig. 13).

In anticipation of taking up the subject of aeronautics on a scale commensurate with its importance, a complete plant has been constructed at the Signal Corps post at Fort Omaha, Nebraska. This plant comprises a steel balloon-house 200 ft. long, 84 ft. wide, and 75 ft. high ; that is, large enough to house a dirigible balloon of the size of the new French military airship, "Le Republique." For furnishing hydrogen gas, an electrolytic plant has been installed, capable of furnishing 3,000 cub. ft. of gas per hour. A gasometer or 50,000 cub. ft. capacity has been provided, to store a sufficient supply of gas for emergencies.

(To be continued.)

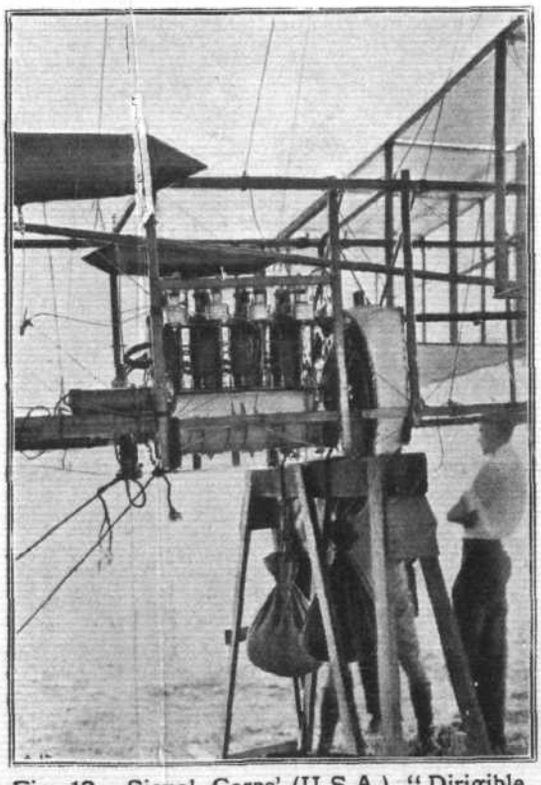


Fig. 12.—Signal Corps' (U.S.A.) "Dirigible No. 1," showing details of engine.

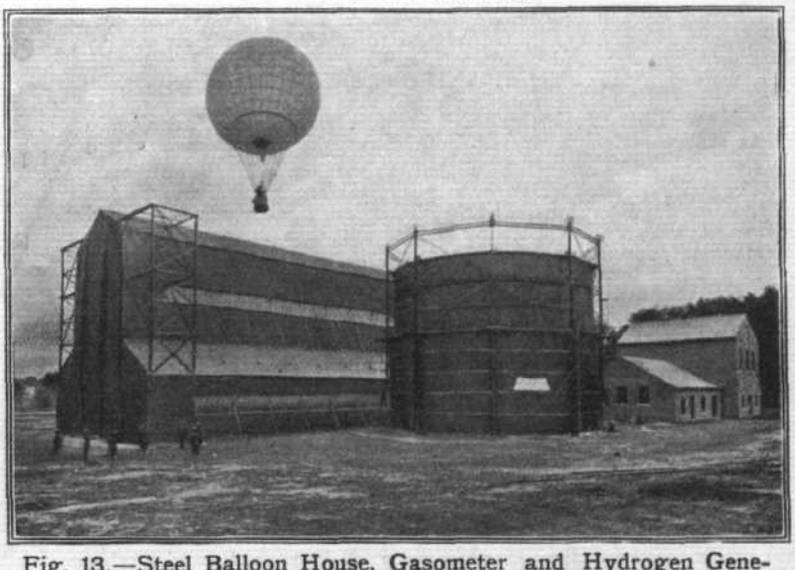


Fig. 13.—Steel Balloon House, Gasometer and Hydrogen Generating Plant, U.S.A. Signal Corps Post, Fort Omaha Nebraska.

BRITISH PATENT SPECIFICATIONS. Selected and Abridged by James D. Roots, M.I.Mech.E., Thanet House, Temple Bar, London.

The first date given is the date of application; the second at the end, the date of the advertisement of the acceptance of the complete specification.

24077. November 10th, 1908. Improvements in or connected with Flying Machines. Messrs. Wilbur Wright and Orville Wright, of 1,127, West Third Street, Dayton, Ohio, U.S.A., now of Pau, France. This invention relates to flying machines of the aeroplane type, and the object of the invention is improvements in their lateral balancing; the object is the realisation of this balancing by the arrangement, on the right and left-hand sides of these machines, of movable wings capable of being presented to the air at different angles of incidence, combined with surfaces the resistance of which to the movement of advance can be regulated synchronously with that of the horizontal wings. The apparatus comprises horizontal planes for aeroplanes, the lateral wings of which are movable, regulatable resistances arranged upon the right and left-hand sides of the machine, and capable of modifying the resistance to advance of the right and left-hand wings. Fig. 1 is a perspective view of a flying machine. Fig. 2 is a horizontal section taken below the upper aeroplane. In these figures is represented a flying machine, comprising aeroplaes placed one over the other, and connected to each other, and of which the lateral portions or wings are adapted to move about horizontal axes, so as to give to the aeroplanes a helicoidal torsion, determining upon each wing the different angles of incidence. The aeroplanes are indicated at 1 and 2; they are connected to each other by means of rigid rods or bars, 3, fixed at their opposite ends by means of flexible or universal joints. Each aeroplane is formed by a rectangular frame, of which the greater length is perpendicular to the line of flight of the machine; this frame is of materials which unite the necessary resistance with the desired degree of flexibility, being, for example, of wood of good quality, or of light metal rods. The two frames of the aeroplanes are covered with cloth, the rear transverse side, b^1, of each frame is formed of a central part, and of two side portions jointed at b. The deformations of the aeroplanes are obtained by means of a cable, 4, fixed at its ends to the rear movable corners of the wings of the upper aeroplane, and passed under guides, 5, carried by the frame of the lower aeroplane by means of small brackets, 6. Between these guides the cable can be moved, either towards the right or towards the left,

FIG. 1.

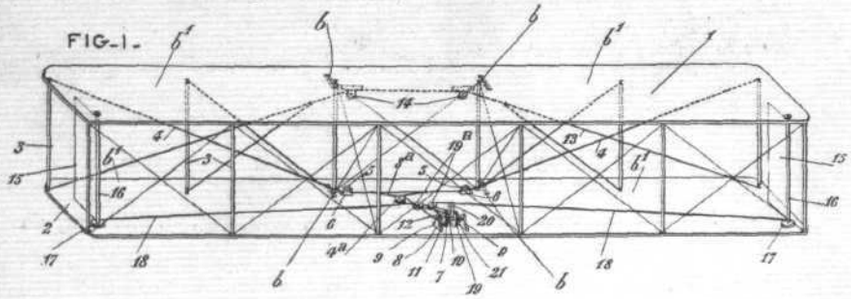
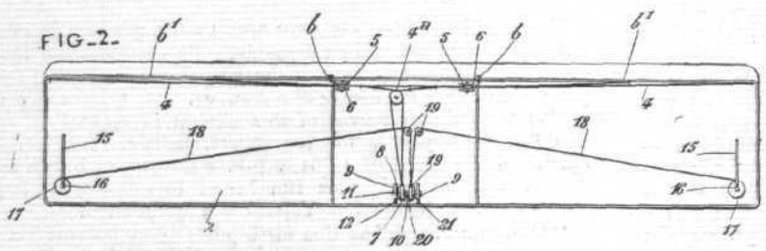


FIG. 2.



by an auxiliary cable, 8^a, carried back by a guide, 4^a, on to a drum, 7, mounted upon a shaft, 8. This shaft is solidly fixed in supports, 9, carried by the lower aeroplane. This drum is provided with a handle, 10, and a brake, 11, which prevents it from rotating about the shaft; a clamping-screw, 12, permits the friction on the shaft to be regulated. A second cable, 13, is fixed at its ends to the lower wings, and carried back on to the guides, 14, of the upper aeroplane. By means of these cables, a single movement of the handle, 10, communicates a helicoidal torsion to the right and left-hand ends of the two aeroplanes, presenting them to the atmosphere at different angles of incidence, which permits, by the regulation of the angles of incidence, of keeping and re-establishing the lateral balance of the machine, the side presenting the greater angle of incidence to the atmosphere tending to rise, while the other side tends to descend. This regulation of the balance would be perfect if a secondary phenomenon did not arise to interfere with the new working of the apparatus. The side of the aeroplane of which the angle of incidence has been augmented presents a more resisting surface to the movement of advance, and its speed diminishes the opposite wing of the aeroplane, presented at the smaller angle of incidence, offering a lesser resistance to this movement, moves more rapidly. For the purpose of opposing the secondary movements which tend to become produced, there are arranged at the right and left hands of the centre of the machine resistances to the movement of advance wings which can be regulated individually, for the purpose of creating on the side of the apparatus, presented at the smaller angle of incidence, a supplementary resistance equal to the difference existing between the resistances to the advance of the right-hand wings and of the left-hand wings, and to thus compel the two sides of the aeroplane to move at the same speed. These regulatable resistances are preferably constituted by vertical vanes, 15, each mounted upon a shaft or a vertical rod, 16, the extremities of such shaft being located in the upper and lower frames of the aeroplanes near their front edges. Beneath each vertical vane, 15, the shaft carries a pulley, 17, upon which is fixed the end of a cable, 18, the other end of which is attached to the corresponding pulley, 17, of the vane, 15, belonging to the other side of the machine. The cable, 18, is provided with devices for working it, and which allow of the vanes, 5 being acted on. This action on the cable, 18, is obtained by means of return pulleys 19^a, and a drum, 19, mounted upon the shaft, 8, provided with a handle, 20, and a brake, 21, the drum and the shaft being similar to the drum, 7, and the brake, 11. The handle, 20, is preferably arranged parallel and quite near to the handle, 10, so that the handles, 10 and 20, may be grasped together by one hand, and so that they can be made to act simultaneously on the drums, 7 and 19. When the handle, 20, is moved in one direction or the other, a pull is exerted upon one of the sides of the cord, 18, the other side of this cord becomes slack. One of the vanes, 15, is thus moved in the desired direction, presents obliquely to the line of flight, and permits the other vane, 15, to return to its normal position, which is parallel to the trajectory of the machine. The brake, 21, serves to maintain the vane in its new position until the drum, 19, has been actuated again to bring it into another, or cause it to resume its normal direction.—March 4th, 1909.

Aeronautical Patents Published.

Applied for in 1908.

Published March 11th, 1909.

5,312. S. Y. BEACH AND G. WHITEHEAD. Aeroplanes.
9,898. C. R. B. BROWN. Aeronautical machines.
11,155. H. H. PIFFARD. Flying machines.
21,181. R. G. WITT. Toy flying machine.
21,445. P. F. DEGN. Flying machines.
24,077. W. AND O. WRIGHT. Flying machines.

Published March 18th, 1909.

19,985. G. DAWS. Dirigible balloons and airships.
28,028. R. ESNAULT-PELTERIE. Aeroplanes.

Published March 25th, 1909.

5,220. E. J. LESTER AND W. G. BEST. Airships and aeroplanes.

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